UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

OCT 25 2012

REDACTED

ENFORCEMENT ACTION MEMORANDUM

SUBJECT: Request for a Time-Critical Removal Action at the VCC Almont Site, Wilmington, New Hanover County, North Carolina

FROM: Alyssa Hughes, On-Scene Coordinator
Emergency Response and Removal Branch

McKenzie Mallary, Remedial Project Manager
Superfund Remedial and Site Evaluation Branch

THRU: Shane Hitchcock, Chief
Emergency Response and Removal Branch

Don Rigger, Chief
Superfund Remedial and Site Evaluation Branch

TO: Franklin E. Hill, Director
Superfund Division

I. PURPOSE

The purpose of this Action Memo is to request and document the approval of the proposed enforcement-lead, Time-Critical Removal Action, described herein for the Virginia Carolina Chemical (VCC) Almont Site ("the Site"), located at 2400 U.S. Highway 421 North in Wilmington, New Hanover County, North Carolina.

II. SITE CONDITIONS AND BACKGROUND

Type: Enforcement-Lead, Time-Critical Removal Action;
CERCLIS ID# NC0002178580

A. Site Description

Phosphate fertilizer manufacturing began at the Site sometime prior to 1904 and continued until 1943. After 1943, the property at the Site was used by the U.S. government for munitions storage and as a military barge repair facility. After the conclusion of World War II, the Site was used again as a fertilizer manufacturing facility. Owners of the post-war fertilizer facility included Robertson Chemical, W.R. Grace, Wilmington Fertilizer, John F. McNair, WS Clark & Sons, and Royster-Clark. The current property owner, Agrium, Inc., stopped fertilizer production in 1998. Agrium has used the Site property for fertilizer storage in recent years.

The buildings associated with the Agrium operations are located in the northeastern portion of the Site property. Portions of the Site around the buildings are paved or covered with concrete and railroad tracks. Based on a 2012 agreement between Agrium and ExxonMobil, the buildings and paved areas have been removed in preparation for the upcoming removal action. One portion of the Site property located between the buildings and paved areas and U.S. Highway 421 is a designated wetland. A second designated wetland is located at the southeastern corner of the Site property adjacent to the Northeast Cape Fear River.

Phosphate-based fertilizer manufacturing at the Site generally involved reacting phosphate ores with sulfuric acid to produce phosphoric acid, the building block of Nitrogen-Phosphorus-Potassium (N-P-K) agricultural fertilizers. As part of the fertilizer-manufacturing process, sulfuric acid was made at the Site and stored in lead-lined chambers. Environmental impacts typically associated with phosphate-based fertilizer manufacturing facilities include elevated concentrations of metals, particularly lead and arsenic in soil, groundwater, and sediment, as well as acidic pH conditions.

1. Removal Site Evaluation

Several investigations have been conducted at the Site. In April 2000, samples were collected by the U.S. Environmental Protection Agency and the North Carolina Department of Environment and Natural Resources (NCDENR) for an integrated Expanded Site Inspection/Removal Assessment (ESI/RA). In November and December 2009, ARCADIS, on behalf of ExxonMobil Environmental Services (EMES), collected samples to evaluate the extent of arsenic and lead in soil, sediment, and surface water. Sample results indicated the presence of elevated lead and arsenic in soil, sediment, and groundwater at levels which exceed the North Carolina Preliminary Health-Based Soil Remediation Goals (PSRGs) for arsenic and lead (4.4 mg/kg and 400 mg/kg, respectively), as well as the site-specific action levels (SSALs) based on industrial land use (27 mg/kg and 895 mg/kg, respectively). The EPA Region 4 Technical Services Section (TSS) concurs with the use of these SSALs for generic industrial exposure scenarios.

2. Physical Location

The Site is located at 2400 U.S. Highway 421 North in Wilmington, New Hanover County, North Carolina. The 38.5-acre Site is bounded to the northeast by the Flowers' property and the Southern States plant (also known as the Northeast Chemical Site), to the south by the Horton Iron and Metal Site, to the west by undeveloped land and U.S. Highway 421, and to the east by the Northeast Cape Fear River. The geographical center of the Site is 34.269964° North Latitude and 77.955061° West Longitude. The primary land use around the Site is industrial/commercial.

(bgs) to about 4 feet bgs. The direction of groundwater flow at the Site is generally towards the Northeast Cape Fear River.

4. **Release or Threatened Release into the Environment of a Hazardous Substance or Contaminant**

The following is a brief bullet summary of the 2009 sampling investigation:

- A total of 195 soil samples were collected from 90 soil borings; arsenic and/or lead concentrations were detected above the NCDENR PSRGs (4.4 mg/kg and 400 mg/kg, respectively), in 56 of 90 soil samples;
- The maximum arsenic concentration in soil (2,110 mg/kg) was collected from soil boring AL-SB-50 located in the center of the main warehouse; the maximum lead concentration in soil (14,500 mg/kg) was also collected from soil boring AL-SB-50;
- Magenta-stained soil/slag was identified at 33 of 90 soil boring locations; magenta-stained soil/slag was identified below the water table at 22 of these soil boring locations;
- Groundwater samples were collected from twelve (12) wells; total arsenic was detected in 10 of 12 monitoring wells at concentrations above the MCL and NC 2L standard of 10 ug/L, while total lead was detected in three (3) of 12 monitoring wells above the MCL and NC 2L standard of 15 ug/L;
- The maximum arsenic concentration in groundwater (5,540 ug/l) was identified in well AL-MW-04; the maximum lead concentration in groundwater (208 ug/l) was also identified in well AL-MW-04;
- A total of twenty-three (23) sediment samples were collected from the wetland area located in the southeastern corner of the Site; arsenic concentrations exceeded the ERM value of 70 mg/kg in five (5) samples while lead exceeded the 218 mg/kg ERM value in Six (6) samples;
- A total of 12 sediment samples were collected from the Northeast Cape Fear River adjacent to the Site; a total of six (6) Category 3 ERM Quotients were identified at sediment sample locations in the wetland area and river; arsenic concentrations were detected above the ERM value of 70 mg/kg in three (3) samples while lead was detected above the ERM value of 218 mg/kg in two (2) samples; and
- A total of five (5) surface water samples were collected from the Northeast Cape Fear River adjacent to the Site; arsenic concentrations in the samples were "non-detect"; lead was present in 4 of 5 samples at concentrations below the North

Carolina Surface Water Standards for lead (25 ug/L).

B. **National Priority List (NPL) Status**

As part of the Phosphate Fertilizer Initiative, ExxonMobil has been working with EPA and the State to address contamination at the Site. This Site is not on the National Priorities List (NPL), but EPA considers the Site to be NPL-equivalent. A ranking package could be prepared in the future, and the Site could be proposed to the NPL, if needed.

C. **Maps, Pictures, and Other Graphic Materials**

Maps and other graphic materials are part of the Removal Action Delineation Report/Removal Action Work Plan.

D. **Other Actions to Date**

1. **Previous Actions**

There have been no known actions by other entities to mitigate conditions at the Site.

2. **Current Actions**

There are no other response actions currently being conducted at the Site.

State and Local Authorities' Roles

The EPA and the NCDENR have provided oversight during the Site Delineation and Removal Site Evaluation of the Site, and will continue to work together to coordinate oversight responsibilities during the Removal Action.

EPA will communicate with local officials prior to the start of the Time-Critical Removal Action. Relevant information regarding Site activities will be provided to local authorities and members of the general public.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT AND STATUTORY AND REGULATORY AUTHORITIES

A. **Threats to Public Health or Welfare**

Section 300.415 (b)(2)(i) – "Actual or potential exposure to nearby human populations, or the food chain from hazardous substances pollutants or contaminants." The sampling investigations conducted in 2009 indicate portions of the Site with elevated levels of arsenic and lead contamination in soil associated with the former phosphate fertilizer manufacturing. The highest level of arsenic in surface and subsurface soil was 2,110 mg/kg. The highest level of lead in surface and subsurface soil was 14,500 mg/kg. These levels of arsenic and lead in soil exceed the SSALs for protection of human health through direct contact exposure (i.e., 27 ppm for arsenic, 895 ppm for lead).

Agrium currently owns the industrial facility which is located within the footprint of the area identified with soil contamination. Potential current and/or future human exposure to site-related contaminants may occur via inhalation windborne dust, inadvertent ingestion of contaminated soil and/or sediment, and direct contact with the contaminated soil and/or sediment until the appropriate response actions are taken to address it.

B. <u>Threats to the Environment</u>

Section 300.415(b)(2)(i) - "Actual or potential exposure to nearby human populations, or the food chain from hazardous substances pollutants or contaminants." The sampling investigations conducted in 2009 indicate sediment in the wetland area and the river in the southeastern portion of the Site with Category 3 mean ERM Quotients, as well as arsenic and lead concentrations exceeding their respective ERM values (70 mg/kg and 218 mg/kg). These levels of arsenic and lead in sediment represent a potential threat to the ecological receptors in these areas until the appropriate response actions are taken to address it.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. <u>Proposed Actions</u>

Due to the inherent uncertainties associated with the removal options evaluated for use at the Site, the On-Scene Coordinator, and the EPA's designated Project Manager, in a manner consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), remain obligated to modify removal procedures as conditions warrant.

1. Description of Proposed Response Action

The preferred response action will address soil and sediment contamination associated with the former phosphate fertilizer manufacturing at the Site with arsenic and/or lead concentrations exceeding the SSALs of 27 ppm and 895 ppm, respectively. Actual excavation limits will be determined in the field based on the confirmation sampling program. The technologies that will be used to address the contamination include excavation, on-site stabilization/immobilization, and re-vegetation.

ExxonMobil will treat and/or dispose of the contaminated soil and sediment according to appropriate industry and regulatory standards. Soils and/or sediments with TCLP arsenic and/or lead concentrations greater than or equal to 5.0 mg/ will either be stabilized and transported to a RCRA Subtitle D landfill for disposal, or transported to a RCRA Subtitle C landfill without being stabilized. Stabilization will be achieved via mixing of a phosphate-based stabilization agent with the soil in batches of approximately 200 tons so that efficient and uniform blending can be achieved.

Institutional Controls (i.e., a restrictive covenant) will be applied to the Site property deed to ensure the long-term protection of human health and the environment at the Site, as well as to ensure the integrity of the Time-Critical Removal Action is not jeopardized by future construction and/or redevelopment activities at the Site.

ExxonMobil will restore areas which are disturbed by the Removal Action to their pre-removal state to the maximum extent practicable. The need for additional groundwater monitoring at the Site will be determined once the Soil Removal Action is complete, and reported to the EPA and NCDENR in a Post-Removal Site Control Plan.

The preferred response action to address soil and sediment contamination, as described in the previous paragraphs, is selected for use at the Site for the following reasons:

- The preferred response action is considered technically feasible because it has been successfully implemented at other sites, and the materials and qualified commercial contractors are readily available;
- The preferred response action offers a balance between effectiveness and cost, (i.e., it is a cost-effective method of providing long-term protection of human health and the environment; and
- The EPA and NCDENR concur on the use of the preferred response action to address soil and sediment contamination at the Site.

2. Contribution to Remedial Performance

The proposed Time-Critical Removal Action will address the potential threats discussed in Section III-A of this document, which meet the removal criteria established in Section 300.415(b)(2) of the NCP. Although future action under the EPA's Remedial program is unlikely, the Removal Action contemplated in this Action Memorandum is considered to be consistent with any future Remedial Action.

3. Description of Alternative Technologies

At this time it is difficult to anticipate what disposal and/or alternatives will be applicable to the waste. Contaminated soil from the Site may be excavated and/or disposed off-site.

Alternatively, contaminated soils in some areas may be capped to eliminate the direct exposure pathway.

4. Applicable or Relevant and Appropriate Requirements (ARARS)

In accordance with the NCP at 40 C.F.R. § 300.415(j), on-site removal actions conducted under the CERCLA are required to attain applicable or relevant and appropriate requirements (ARARs) to the extent practicable considering the exigencies of the situation, or provide grounds for invoking a CERCLA waiver under Section 121(d)(4). In determining whether compliance with ARARs is practicable, the lead agency may consider appropriate factors, including (1) the urgency of the situation and (2) scope of the removal action to be conducted. Additionally, under 40 C.F.R. 300.405(g)(3), other advisories, criteria, or guidance may also be considered (so-called To-Be-Considered or TBC) when conducting the removal action. The site-specific ARARs and TBC for this time-critical removal action, which EPA deems compliance is practicable, are attached in a letter sent by the NCDENR.

5. <u>Project Schedule</u>

The Removal Action Delineation Report/Removal Action Work Plan has been finalized for the Time-Critical Removal Action. ExxonMobil plans to initiate the Removal Action in October 2012, and complete the Removal Action by May 2013.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If action is significantly delayed or not taken at the Site, the threats explained in Section III of this Action Memorandum will continue to exist. The ExxonMobil Corporation (ExxonMobil), the successor in interest to the VCC Almont site, voluntarily entered into an Administrative Order on Consent (AOC) with the EPA, to conduct a removal action to address the contamination, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

VII. OUTSTANDING POLICY ISSUES

There are no outstanding policy issues at this time.

VIII. ENFORCEMENT

Exemption 7 X (A) Interference with Enforcement Proceedings
____(B) Right to Fair Trial
____(C) Unwanted Invasion of Personal Privacy

IX. RECOMMENDATION

This decision document sets forth the selected Time-Critical Removal Action for the VCC Almont Site located in Wilmington, New Hanover County, North Carolina. It has been developed in accordance with CERCLA, as amended, and is consistent with the NCP.

The selection of the preferred response actions is based on the Administrative Record for the Site. Conditions at the Site meet the NCP section 300.415 (b)(2) criteria for a Time-Critical Removal Action. The NCDENR concurs with the proposed response actions in this Action Memorandum. The Time-Critical Removal Action is scheduled to begin in October 2012, and will be completed by May 2013.

I recommend your approval of the proposed Time-Critical Removal Action.

Approval: ______________________ Date: 10/25/12
Franklin E. Hill, Director
Superfund Division

Disapproval: ______________________ Date: ______________
Franklin E. Hill, Director
Superfund Division

ARCADIS
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ExxonMobil Environmental
Services Company

Site Delineation Work Plan

Former Virginia-Carolina Chemical Corporation Site

Charlotte, Mecklenburg, North Carolina

November 2010, Revised January 2011

MATT PELTON cell) 919.270.9512
349 West Tremont Avenue

LEGEND:

- PROPERTY LINES
- FENCE
- ASPHALT
- TREES
- WATER LINE
- GAS LINE
- ELECTRIC
- OVERHEAD ELECTRIC
- RIP RAP
- SOIL BORING LOCATION BELOW SCREENING LEVELS
- SOIL BORING LOCATION WITH As AND/OR Pb ABOVE USEPA AND NCDENR SCREENING LEVELS
- SOIL BORING LOCATION WITH As AND/OR Pb ABOVE NCDENR SCREENING LEVELS
- LOCATION OF PROPOSED SOIL BORING
- LOCATION OF PROPOSED GROUNDWATER MONITORING WELL

NOTES:

1. BASEMAP AND SOIL BORING LOCATIONS PROVIDED BY TAYLOR, WISEMAN & TAYLOR ON NOVEMBER 02, 2010. SOIL BORINGS 1-5, 12, 13, 20 AND 21 WERE LOCATED BY ARCADIS IN APRIL 2010 USING GPS.
2. SOIL BORINGS BEGIN WITH THE PREFIX "CH-".
3. mg/kg – MILLIGRAMS PER KILOGRAM.
4. USEPA – UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.
5. NCDENR – NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES.

0 60' 120'
GRAPHIC SCALE

USEPA SCREENING LEVELS	
ARSENIC (As)	27 mg/kg
LEAD (Pb)	895 mg/kg

NCDENR SCREENING LEVELS	
ARSENIC (As)	22 mg/kg
LEAD (Pb)	400 mg/kg

EXXONMOBIL
VCC-CHARLOTTE, NORTH CAROLINA
SITE DELINEATION WORK PLAN

PROPOSED SOIL BORING AND GROUNDWATER MONITORING WELL LOCATIONS

ARCADIS

FIGURE
3-1

ARCADIS

Kirstyn White, P.E.
Environmental Engineer

Matthew T. Pelton P.E.
Senior Environmental Engineer

Geoffrey Germann, P.E.
Principal Engineer

Site Delineation Work Plan

Former Virginia-Carolina Chemical Corporation Site, Charlotte, Mecklenburg County, North Carolina

Prepared for:
ExxonMobil Environmental Services Company

Prepared by:
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Our Ref.:
B0085793

Date:
November 2010, Revised January 2011

ARCADIS G&M of North Carolina, Inc.
NC Engineering License # C-1869

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LIST OF ACRONYMS AND ABBREVIATIONS

ARCADIS	ARCADIS G&M of North Carolina, Inc.
bgs	below ground surface
COCs	Constituents of Concern
DENR	Department of Environment and Natural Resources
EMES	ExxonMobil Environmental Services Company
FSP	Field Sampling Plan
HASP	Health and Safety Plan
IDW	investigation-derived waste
IHSB	Inactive Hazardous Sites Branch
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
NAD83	North American Datum of 1983
NCGS	North Carolina Geological Survey
QAPP	Quality Assurance Project Plan
PPE	personal protective equipment
PWR	partially weathered rock
RAWP	Removal Action Work Plan
RSE	Removal Site Evaluation
SCS	Soil Conservation Service
SDR	Site Delineation Report
SSSLs	Site-specific screening levels
STATSGO	State Soil Geographic Database
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
TestAmerica	TestAmerica, Inc. of Nashville, Tennessee
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
VCC	Virginia-Carolina Chemical Corporation
Work Plan	Site Delineation Work Plan
XRF	x-ray fluorescence

1. Introduction

This Site Delineation Work Plan (Work Plan) has been prepared by ARCADIS G&M of North Carolina, Inc. (ARCADIS) on behalf of ExxonMobil Environmental Services Company (EMES) to outline the technical approach and methods for conducting soil and groundwater sampling activities to investigate constituents of concern (COCs) associated with the former Virginia-Carolina Chemical Corporation (VCC) Site located in Charlotte, Mecklenburg County, North Carolina (hereafter referred to as "the Site"). Figure 1-1 identifies the location of the Site on the United States Geological Survey (USGS) 7.5-minute quadrangle maps for Charlotte West and East, North Carolina.

This Work Plan has been developed based on the findings of the *Removal Site Evaluation (RSE) Report, Former Virginia-Carolina Chemical Corporation Site, Charlotte, Mecklenburg County, North Carolina* prepared by ARCADIS on behalf of EMES and submitted to the United States Environmental Protection Agency (USEPA) in July 2010.

1.1 Project Objectives

The objective of the delineation activities is to determine the magnitude and extent of arsenic and lead concentrations in soil at the Site. A second objective is to determine if arsenic and lead are present in groundwater above USEPA screening levels and/or North Carolina Department of Environment and Natural Resource (NCDENR) 2L groundwater standards, and if so, to determine their magnitude and extent. These data will be used to support the development of a work plan to guide implementation of the anticipated future activities at the Site. This Work Plan and supporting documents describe and guide the activities that will be undertaken to achieve this objective.

1.2 Description and History of Former Phosphate Fertilizer Plants

VCC operated a former phosphate/fertilizer plant in Charlotte, North Carolina. The following description and history of former phosphate/fertilizer plants in the southeast was originally presented by the United States Environmental Protection Agency (USEPA, 1997) and is included here to provide an understanding of the history and processes associated with the historical production of phosphate fertilizers.

Phosphorus is one of the major elements essential for normal plant growth. In the mid-1800s patent fertilizers and superphosphates were unknown; rather, manure, guanos, ground-up bone, and other mineral-rich materials were used by farmers. The discovery of large deposits of phosphate rock, combined with the demand for superior fertilizers, resulted in the growth of the phosphate/fertilizer industry in the southeastern United States.

Naturally occurring phosphorus in phosphate rock is largely insoluble. When properly dried, the phosphate rock can be easily ground and crushed. It was initially discovered in England that, when treated with sulfuric acid, ground phosphate rock is converted to phosphoric acid, which is more easily assimilated by plants. In most plants, sulfuric acid was generally manufactured onsite using the lead chamber process. Sulfur was burned in a combustion chamber at 1,800°F to 2,000°F to create sulfur dioxide (SO_2). In the early years of operation, pyrite ores (FeS_2) were used as the sulfur source. Elemental sulfur was later discovered in Texas and most plants switched to burning sulfur due to advantages in product purity and economics. Sulfur dioxide was reacted with oxygen (O_2) from air to form sulfur trioxide (SO_3). Water (H_2O) was passed over packing media in a Glover Tower to react with the sulfur trioxide gas. This reaction produced sulfuric acid (H_2SO_4).

Ground phosphate rock and sulfuric acid were then mixed in a reaction vessel to produce phosphoric acid, the building block for phosphate fertilizers. The resultant mixture was then held in a den area for solidification, and later transferred to a storage area for curing. This process produced a bulky phosphate mass that had to be mechanically crushed and screened to product size prior to shipment. Agricultural fertilizers differ in the amount and chemical form of three primary plant nutrients: nitrogen, phosphorus, and potassium. Super-phosphate contains only one nutrient, phosphorus. Therefore, processed phosphate rock was mixed with other components such as ammonia (for nitrogen) and potash (for potassium) to produce a three-component product. The finished product was bagged or otherwise prepared for distribution in the storage facility.

The acid chambers used in the fertilizer production process represent the most relevant feature of phosphate/fertilizer operations regarding the potential for adverse environmental impacts. During periodic cleaning of the lead chambers, it is believed wash down water containing acid and soluble lead was flushed onto the ground surface. Pyrite cinders that did not burn completely in the combustion chambers may have been used as on-site fill material. This slag material has a reddish (magenta) appearance and has been found to contain elevated levels of inorganic constituents, including arsenic and lead.

1.3 Work Plan Organization

The introduction provided in this section is followed in Section 2 by a site description and a discussion of previous investigation activities performed at the Site. Section 3 presents the components of the delineation activities that will be performed and Section 4 describes the contents of the summary report that will be prepared. Section 5 describes the project team organization, and Section 6 provides the schedule for implementing the site delineation activities. Finally, Section 7 lists the references cited in this Work Plan.

This Work Plan has three appendices. Appendix A contains the Field Sampling Plan (FSP); Appendix B contains the Quality Assurance Project Plan (QAPP); and Appendix C contains the Health and Safety Plan (HASP). These documents will be used to guide the proposed field investigation activities required to complete the delineation activities.

2. Site Description and Background

2.1 General

Virginia-Carolina Chemical Company purchased the site from Charlotte Oil and Fertilizer Company in 1901. At the conclusion of Virginia-Carolina Chemical Company's bankruptcy and reorganization proceedings in 1926, VCC of Richmond, Virginia emerged as a new company and continued to own the Charlotte fertilizer plant until 1970. VCC merged into Socony Mobil Oil Company, Inc. in 1963, and the company name changed in 1966 to Mobil Oil Corporation. Mobil Oil Corporation sold the Charlotte plant site in 1970 to Swift Agricultural Chemical Corporation. In 1999, Exxon Corporation merged with Mobil Corporation to form Exxon Mobil Corporation. Mobil Oil became ExxonMobil Oil Corporation, the corporate successor to VCC. Exxon Mobil Corporation is the parent company of ExxonMobil Oil Corporation.

A review of the available Sanborn Fire Insurance maps confirmed that the facility was a complete factory with acid production facilities. Based on the historical information fertilizer manufacturing began at the plant site prior to 1890 and continued until sometime between 1929 and 1934. Minutes from the 1934 VCC Board of Directors meetings indicate that the acid chamber burned down prior to 1934. The Fertilizer Yearbook table indicates that the last year for acid production was 1934. During manufacturing, the facility had a single acid chamber structure that was replaced sometime between 1911 and 1929. In addition to the acid chamber, sulfur burners were present on-site in the 1890's and early 1900's, indicating that the plant burned sulfur in the production of acids. Figure 2-1 depicts the general locations of the former site features.

This section of the Work Plan is based on information previously provided to USEPA in the following three documents, which are incorporated herein by reference:

- Streamlined Property Report, Former Virginia-Carolina Chemical Corporation Site - Charlotte, North Carolina (Property Report). BBL, 2006.
- Removal Site Evaluation Work Plan, Former Virginia-Carolina Chemical Corporation Site, Charlotte, Mecklenburg County, North Carolina. ARCADIS, January 2010.
- Removal Site Evaluation Report, Former Virginia-Carolina Chemical Corporation Site, Charlotte, Mecklenburg County, North Carolina (RSE Report). ARCADIS, July 2010.

2.2 Site Location

The Site is located in Charlotte, Mecklenburg County, North Carolina (Figure 1-1). The current street address that most closely matches the former acid chamber location is 349 West Tremont Avenue. The geographical location of the center of the Site is at 35.21020° North Latitude and 80.86517° West Longitude (North American Datum of 1983 [NAD83]).

2.3 Facility Description and Operational Status

As described in Section 2.1, the Charlotte facility became a complete plant, with an acid chamber structure, that produced phosphate fertilizers prior to 1890 until sometime between 1929 and 1934.

Structures associated with the former plant included one acid chamber structure (located in two different areas of the site at different points in time), and associated burners, dry mixing plant, supply house, wash house, railroad sidings, a fertilizer factory, a fertilizer warehouse, a bag house, a 50,000-gallon water tower, a nitre house and an office. Figure 2-1 depicts the approximate locations of the historical site features digitized from Sanborn maps.

2.4 Current Uses of the Former Property

The Site is currently occupied with commercial and light industrial facilities located within the Tremont Center owned by Tremont Industrial Park, LLC. The former VCC property can be accessed from West Tremont Avenue, which forms the northern boundary of the site. A vast majority of the former site is currently paved as asphalt driveways and parking lots or covered by the Tremont Center buildings.

Surrounding land use of the former Charlotte property includes commercial and industrial facilities, residential apartments, restaurants, a music hall, a shopping mall, and an abandoned gas station. The nearest residential properties are two apartment buildings located east and southeast along Hawkins Street. Refer to Figure 2-1 for the listing of surrounding properties.

Currently, the former Charlotte site is occupied by two tax parcels owned by Tremont Industrial Park, LLC. Property ownership information was provided by the Mecklenburg County GIS and Property Ownership Land Records Information System.

2.5 Area Geology and Hydrogeology

The Site is located in the Upland Piedmont Physiographic Province in North Carolina, which is characterized by gently rolling, well-rounded hills and ridges with a few hundred feet of elevation difference between the hills and valleys (NCGS, 2004). Specifically, the Site is located within a lithotectonic region known as the Charlotte Belt (Goldsmith et. al., 1988). Bedrock geology in the Charlotte Belt is dominated by crystalline rocks that formed between 900 million and 248 million years ago. Goldsmith et. al. (1988) have mapped and classified the bedrock in the vicinity of the site as metamorphosed quartz diorite and tonolite. These closely related rock types are characteristically grey in color, generally exhibit a massive to weakly foliated structure, and are composed of a variety of minerals including plagioclase feldspar, quartz, biotite, hornblende, and epidote.

In the North Carolina Piedmont, bedrock is typically overlain by a layer of regolith, also known as overburden. Overburden varies in thickness and composition depending on the topography and geologic history of the area, but commonly consists of a variety of unconsolidated soil types including topsoil, alluvium, saprolite, and partially weathered rock (PWR). Saprolite, a major component of overburden, is the residual product of in-place chemical weathering of crystalline bedrock. PWR commonly exists in a transition zone between highly weathered saprolite and competent bedrock. Although the mineral composition of PWR differs from the parent bedrock due to weathering, PWR commonly retains many of the structural features of the parent bedrock including fractures, joints, and foliation. The contact between PWR and competent bedrock is often irregular and erratic, even over relatively short horizontal distances, due to variability in resistance to weathering controlled by structural features and natural variations in mineral composition.

The hydrogeology of the region is characterized by a two-part groundwater system, consisting of overburden and bedrock aquifers. Overburden is the primary storage reservoir for the underlying bedrock and has high porosity and low permeability. Precipitation is stored as groundwater in the intergranular spaces of the overburden as it infiltrates through the subsurface. The water table typically exists within the overburden and the direction of shallow groundwater flow generally mimics the slope of the land surface.

Review of the State Soil Geographic Database (STATSGO) soil survey data compiled by United States Department of Agriculture (USDA) Soil Conservation Service (SCS) indicates that the underlying soils of the Site (Mecklenburg County) are classified as urban land and are variable in texture. Native soils in the immediate Site vicinity are classified as Cecil sandy clay loam, and consist of well drained, coarse-grained sand, clay, and silt with moderate infiltration rates (EDR, 2009).

Based on the limited data collected from shallow soil borings advanced at the Site during the Removal Site Evaluation (ARCADIS, 2010), the subsurface generally consists of orange brown to reddish brown silty clay and clayey silt with varying amounts of fine-grained gravel and rootlets. Orange brown to dark brown silt and sandy silt were also observed in the shallow subsurface in several of the soil borings. Gravel was encountered at depths varying from the ground surface to 4 feet below ground surface (bgs).

Fill materials consisting of sulfur (in borings CH-SB-23 and CH-SB-24) and coal (in boring CH-SB-24) fragments were observed in soil borings advanced in the southwestern portion of the Site extending from 0.5 to 4 feet bgs. Additional limited fill materials, including black and magenta slag and brick fragments, were observed in soil borings advanced in the central (borings CH-SB-10 and CH-SB-11) and southwestern (boring CH-SB-23) portions of the Site, at depths varying from the ground surface to 4 feet bgs. No fill materials or magenta slag were observed in any of the remaining soil borings. Groundwater was not encountered in any of the soil borings, which were advanced to a maximum depth of 8 feet bgs during the RSE field activities.

2.6 Surface Water Bodies

The Site is located near the border of the Catawba and Yadkin River Basin. No surface water features are present on or immediately adjacent to the Site. The two closest surface water features are tributaries of Irwin Creek and Dairy Branch. Irwin Creek is located approximately 4,000 feet west of the Site (Figure 1-1). Irwin Creek flows southwest and joins with Sugar Creek which feeds into the Catawba River. Tributaries of Dairy Branch are located approximately 3,000 feet southeast of the Site. Dairy Branch flows southeast and joins with Little Sugar Creek which feeds into the Catawba River. The Catawba River ultimately discharges to the Atlantic Ocean.

2.7 Description of Drinking Water Sources

Water is supplied to the area around the Site by Charlotte-Mecklenburg Utilities. Mountain Island Lake and Lake Norman supply the drinking water and are located approximately 10 miles and 15 miles northwest of the Site, respectively. There are no active public water supply wells in the vicinity of the Site (EDR, 2009 and personal communication with Jack Stutts of the Mecklenburg County Department of Groundwater and Wastewater in October 2010).

2.8 Summary of Previous Investigations

In April 2010, ARCADIS, on behalf of EMES, collected soil samples from the Site as described in the RSE Report (ARCADIS, 2010). Soil sample results were compared to the USEPA screening levels of 27 mg/kg and 895 mg/kg for arsenic and lead, respectively. However, in order to meet the soil screening level objectives of both USEPA and NCDENR, analytical results from soil samples collected during site delineation activities will be compared to site-specific screening levels of 22 mg/kg for arsenic and 400 mg/kg for lead. The screening levels are based on NCDENR Inactive Hazardous Sites Branch (IHSB) Soil Remediation Goals for arsenic and lead. A summary of the April 2010 sampling results is provided below.

2.8.1 Soil Sample Results

A total of 79 soil samples were collected from 25 soil borings advanced at the Site (Figure 2-2). In general, samples were collected from 0-0.5 feet, 0.5-2 feet, and in 2-foot intervals thereafter to depths of up to a maximum of 8 feet bgs. Samples were screened in the field for arsenic and lead using a portable x-ray fluorescence (XRF) device. The soil samples were then submitted to, and analyzed by, TestAmerica, Inc. of Nashville, Tennessee (TestAmerica) for arsenic, lead, and pH.

Arsenic was detected in 15 soil samples from 10 soil boring locations at concentrations exceeding the USEPA screening level of 27 mg/kg. Based on the NCDENR IHSB Preliminary Health Based Soil Remediation Goal of 22 mg/kg, arsenic concentrations exceeded NCDENR screening levels in 20 soil samples from 13 soil boring locations. Lead was detected in one soil sample (CH-SB-19) collected from 0 to 0.5 feet bgs at a concentration exceeding the USEPA screening level of 895 mg/kg. Based on the NCDENR IHSB Preliminary Health Based Soil Remediation Goal of 400 mg/kg, lead concentrations exceeded NCDENR screening levels in 4 soil samples from 2 soil boring locations. The maximum arsenic concentration of 267 mg/kg was collected from soil boring CH-SB-24 at a depth of 0.5 to 2 feet bgs. The maximum lead concentration of 20,100 mg/kg was collected from soil boring CH-SB-19 at a depth of 0 to 0.5 feet bgs. The pH of the soil samples varied between 3.1 and 7.6 standard units.

Thirteen of the 25 boring locations sampled had arsenic and/or lead concentrations that exceeded the screening levels. Soil boring locations with arsenic and/or lead concentrations greater than the screening levels are presented on Figure 2-2. A summary of the RSE analytical program is provided in Table 2-1. A complete summary of the sample analytical results is presented in Table 2-2.

3. Site Delineation Rationale and Activities

3.1 Data Requirements

As described in Section 2.8, data generated from the RSE activities indicated the presence of elevated concentrations of arsenic and lead in specific areas of the site. The delineation activities described in this section will focus on the collection of soil samples around these locations to delineate the extent of arsenic and/or lead in Site soils. Soil samples will be collected from both the surface and at depth. Groundwater monitoring wells will be installed and sampled to investigate the presence of arsenic and/or lead in groundwater. This section describes the sampling activities that will be performed to delineate the extent of these constituents in Site media.

3.2 Site Access

EMES will secure a new access agreement with Tremont Industrial Park, LLC (Tax Parcel IDs 12103218 and 12103217) prior to the start of site delineation activities.

EMES will secure access agreements from adjacent properties if needed based on the results of the initial delineation sampling described herein, as necessary.

3.3 Utility Clearance

Necessary permits and utility clearances will be obtained prior to any subsurface activities. A utility markout will be performed at the Site to identify all subsurface utilities (e.g., gas, electrical, telephone, water, sewers, cable television). No drilling will be performed within five (5) feet of a utility markout without prior approval from ExxonMobil. To further confirm the absence of utilities in the drilling area, a private utility locating company will also be used to clear all areas where subsurface work will be performed. Detailed utility clearance procedures are contained in the HASP (Appendix C).

3.4 Soil Sampling Program

3.4.1 Soil Sampling Analyses and Rationale

Soil borings will be installed across the Site to delineate the horizontal and vertical extent of arsenic- and/or lead-impacted soil, focusing on those areas identified during the RSE sampling event. All soil sample results will be compared to the site-specific screening levels (SSSLs).

As stated in Section 2.8, soil sample results from samples collected during RSE activities were compared to USEPA-determined screening values of 27 mg/kg and 895 mg/kg for arsenic and lead, respectively. However, in order to meet the soil screening level objectives of both USEPA and NCDENR, analytical results from soil samples collected during site delineation activities will be compared to site-specific screening levels of 22 mg/kg for arsenic and 400 mg/kg for lead. The screening levels are based on NCDENR Inactive Hazardous Sites Branch (IHSB) Soil Remediation Goals for arsenic and lead.

Soil borings are proposed at 29 locations across the Site, including the seven proposed monitoring well borings discussed in Section 3.5. Additional contingency borings will also be advanced and sampled if adjacent borings are impacted based on the results of field screening (described below). Proposed soil sample locations are shown on Figure 3-1.

Soil samples will be collected using hand augers and/or direct push techniques and screened in the field using a portable XRF device. Soil samples will be collected from 0-0.5 feet, 0.5-2 feet, 2-4 feet and in 2-foot intervals until XRF results for arsenic and lead are less than the screening levels and no magenta slag is observed. Borings will be advanced until groundwater or refusal is encountered, whichever is shallower. Sample collection procedures are described in the FSP provided in Appendix A.

The presence of slag and the coloration of soil samples collected will be documented in the field notes and included in the investigation summary report that will be prepared following implementation of the Work Plan. Additional soil sampling activities may also be performed during this investigation at the discretion of EMES or at the request of USEPA to further refine the limits of areas that contain elevated concentrations of arsenic and/or lead.

3.4.2 Soil Sample Analyses

3.4.2.1 XRF Screening

Soil samples collected will be screened in the field for arsenic and lead concentrations using a portable XRF device; samples will be retained and sent to a fixed-based laboratory for analyses as described below.

3.4.2.2 Laboratory Analyses

Soil samples collected from 0 to 4 feet bgs will be analyzed at the fixed-based laboratory for arsenic, lead and pH. Samples will be analyzed from successively deeper intervals until the concentrations of arsenic and lead are confirmed to be below the screening levels. Samples from deeper intervals will be analyzed as described below.

Soil Sample Depth Interval (feet bgs)	Analyze w/XRF?	Analyze at laboratory?
0 – 0.5	Yes	Yes, always
0.5 – 2	Yes	Yes, always
2 – 4	Yes	Yes, always
4 – 6	Yes	Yes, if XRF results are above XRF screening levels in the 2-4 foot depth interval of 17 mg/kg for arsenic or 300 mg/kg for lead. XRF screening levels are based on 75% of the SSSLs for arsenic and lead, respectively.
6 – 8	Yes	Yes, if XRF results are above XRF screening levels in the 4-6 foot depth interval of 17 mg/kg for arsenic or 300 mg/kg for lead. XRF screening levels are based on 75% of the SSSLs for arsenic and lead, respectively.

Select samples may be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals to determine the appropriate disposal requirements for evaluating potential soil removal alternatives. TCLP analyses will be performed using a composite of the soil samples collected. The specific samples selected for TCLP analyses will be determined following receipt of preliminary laboratory analytical data. Soil borings selected for TCLP analyses will be biased toward those locations where elevated concentrations of arsenic and lead are detected or where significant amounts of magenta-stained soils are observed. The composite soil samples will be analyzed for total arsenic and lead and TCLP arsenic and lead. The soil sampling analytical program is presented in Table 3-1.

3.5 Groundwater Sampling Program

3.5.1 Groundwater Monitoring Well Sampling Analysis and Rationale

Seven shallow groundwater monitoring wells will be installed at the Site to assess the potential impacts to the shallow aquifer resulting from rainwater infiltrating through soils containing elevated concentrations of arsenic and/or lead. Monitoring wells will be installed with a uniform distribution across the site to provide a site-wide assessment of groundwater quality and hydraulic gradient. Proposed monitoring well locations are shown on Figure 3-1; actual locations may be adjusted in the field based on observed site conditions.

As described in more detail below, groundwater samples will be collected from each of the groundwater monitoring wells to assess groundwater quality at the Site. Groundwater elevations will also be gauged to determine the direction and gradient of groundwater flow. A site-specific potentiometric surface map will be generated and included in the summary report that will be prepared following the completion of site delineation activities.

3.5.2 Permanent Groundwater Monitoring Well Installation

Groundwater monitoring wells will be installed to facilitate the collection of shallow groundwater samples and the measurement of groundwater elevations. The wells will be screened so that the top of the well screen is just above the water table. Prior to construction of the monitoring wells, a soil boring will be advanced adjacent to each of the proposed monitoring well locations. An XRF will be used to screen these borings for arsenic and lead concentrations in soil. In the event that elevated concentrations of arsenic or lead are detected, or if slag or magenta-stained soil is observed, the monitoring well at that location will be completed as a double-cased monitoring well to reduce the potential downward transport of these materials during drilling. All monitoring wells will be installed and developed in accordance with the procedures specified in the FSP provided in Appendix A.

3.5.3 Groundwater Sample Collection and Analysis

A groundwater sample will be collected from each of the seven groundwater monitoring wells following installation and well development. Samples will be collected using low-flow/low-stress sampling techniques in accordance with the procedures specified in the FSP (Appendix A). All groundwater samples will be analyzed for the following analytical parameters using the analytical procedures specified in the QAPP (Appendix B):

- Arsenic and lead; and

- pH, temperature, conductivity, dissolved oxygen, redox potential, and turbidity (field measurements).

The groundwater sample analytical program is summarized in Table 3-2.

3.5.4 Hydraulic Conductivity Testing

Slug injection and removal tests will be performed at all installed groundwater monitoring wells to provide data for calculating the hydraulic conductivity of the water table aquifer beneath the Site. The slug tests will be performed in accordance with the procedures specified in the FSP (Appendix A).

3.6 Groundwater Elevation Measurement

One round of groundwater elevation measurements will be recorded from the monitoring wells. The data will be used to develop a shallow groundwater potentiometric surface map for the Site. Depth-to-water measurements will be performed in accordance with the procedures specified in the in the FSP (Appendix A).

3.7 Surveying

All soil borings and monitoring wells will be surveyed for horizontal and vertical control. All survey data will be referenced to the North American Horizontal Datum of 1983 and the North American Vertical Datum of 1988.

3.8 Investigation-Derived Waste Sampling and Disposal

Waste generated as part of the delineation activities (i.e., soil, water, decontamination fluids, and personal protective equipment [PPE]) will be collected in drums and stored at the Site prior to removal. Laboratory analysis will be performed on a quick turn-around schedule to minimize the amount of time that the drums are at the Site. Drums containing solids will be analyzed for TCLP metals, while drums containing aqueous solutions will be analyzed for Target Analyte List (TAL) metals and pH. The investigation-derived waste (IDW) sample analytical program is summarized in Tables 3-1 and 3-2.

3.9 Analytical Data Validation

All laboratory analytical data generated from the sample analyses will be validated in accordance with the procedures listed in the QAPP (Appendix B).

4. Reporting

A Site Delineation Report and Removal Action Work Plan (SDR/RAWP) will be prepared that summarizes available data from the Site. It will present and evaluate the results of all data collection activities performed during implementation of this Work Plan as well as outline the technical approach and methods for conducting future activities at the Site. Specifically, the SDR/RAWP will include the components described below:

- **Data Collection Activities:** This section will describe the activities associated with the data collection activities described in this Work Plan.
- **Summary of Results:** This section will summarize data collected during implementation of this Work Plan and previous investigations.
- **Removal Action Work Plan:** The data generated by previous investigations and during implementation of this Work Plan will be evaluated to provide a technical approach and describe the methods for conducting future actions at the Site.

The SDR/RAWP will be prepared and submitted in accordance with the schedule presented in Section 6.

5. Project Organization

5.1 Introduction

Several organizations will be directly involved in the performance and review of this project. These organizations have specific project functions and relate to each other in various ways according to their project responsibilities. The purpose of this section is to provide a description of the overall project organization. This section also describes the function and responsibility of various groups to aid in the exchange of information and to provide efficient project implementation. Table 5-1 provides contact information for key individuals working on the project.

5.2 USEPA

The USEPA Region IV and EMES have agreed that EMES will perform site delineation activities at the VCC-Charlotte, North Carolina Site. The USEPA will review, comment upon, and ultimately approve all plans and reports submitted for the site characterization. The USEPA contact for this Site will be Mr. Ken Mallary.

5.3 North Carolina Department of Environment and Natural Resources (NCDENR)

The NCDENR will review and comment upon all plans and reports submitted for the site characterization. The NCDENR contact for the Site is Mr. David Mattison.

5.4 EMES - Responsible Party

USEPA Region IV and EMES have agreed that EMES will perform site delineation activities. EMES is the Responsible Party for the activities at the former VCC-Charlotte, North Carolina Site. Ms. Lauren Gordon is EMES's corporate representative overseeing the project.

5.5 Evaluation Contractor

ARCADIS G&M of North Carolina, Inc. of Cary, North Carolina has been selected by EMES, the Respondent, as the Evaluation Contractor. All work will be performed under the supervision of the ARCADIS Project Manager, Mr. Matt Pelton, and the ARCADIS Assistant Project Manager, Ms. Kirstyn White.

6. Schedule

It is expected that the activities outlined herein will be completed in accordance with the following schedule:

• Obtain USEPA approval of this Work Plan	15 days
• Secure access agreements	30 days
• Procure Contractors and Equipment and Mobilize	15 days
• Complete Site Delineation and Sampling Activities	15 days
• Laboratory Analysis of Samples	30 days
• Data Validation	30 days
• Prepare/Submit the SDR/RAWP	60 days

7. References

ARCADIS, 2010. Removal Site Evaluation Report, Former Virginia-Carolina Chemical Corporation Site, Charlotte, North Carolina, July 2010.

ARCADIS, 2010. Removal Site Evaluation Work Plan, Former Virginia-Carolina Chemical Corporation Site, Charlotte, North Carolina, January 2010.

Blasland, Bouck & Lee, Inc., 2006. Streamlined Property Report, Former Virginia-Carolina Chemical Corporation Site – Charlotte, North Carolina (Property Report). BBL, 2006.

Environmental Data Resources (EDR), 2009. The EDR Radius Map™ with GeoCheck®, VCC-Charlotte, 301 West Tremont Ave., Charlotte, NC 28203, Inquiry Number: 2662591.2s. December 18, 2009.

Goldsmith et. al., 1988. *Geologic Map of the Charlotte 1° x 2° Quadrangle, North Carolina and South Carolina*. Goldsmith, Richard et. al. United States Geological Survey (USGS) Miscellaneous Investigation Series Map I-1251-E. 1988.

LeGrand, 2004. *A Master Conceptual Model for Hydrogeological Site Characterization in the Piedmont and Mountain Region of North Carolina: A Guidance Manual.* LeGrand, H.E. Prepared for the North Carolina Department of Environment and Natural Resources (DENR), Division of Water Quality, Groundwater Section. February 2004.

LeGrand and Mundorff, 1952. *Geology and Ground Water in the Charlotte, North Carolina Area*. LeGrand, H.E. and Mundorff, M.J. Prepared by the North Carolina Department of Conservation and Development, Division of Mineral Resources in cooperation with the United States Department of Interior, Geological Survey. Bulletin Number 63. 1952.

Table 3-1
Soil and IDW Sample Analytical Program
Site Delineation Work Plan
VCC Charlotte, North Carolina

Parameter	Estimated Number of Borings	Estimated No. of Samples per Boring [1]	Estimated No. of Field Samples [1]	No. of Field QC Samples: Field Duplicate	No. of Field QC Samples: Rinse Blank	No. of Field QC Samples: Trip Blank	Total No. Field + Field QC Samples[1]	No. of MS/MSD Samples Sets
Soil Delineation Samples								
Total Arsenic and Lead	29	5	145	8	4	0	157	8
pH	29	5	145	8	0	0	153	8
Waste Disposal Characterization Samples								
TCLP Arsenic and Lead	10	1	10	1	0	0	11	1
Total Arsenic and Lead	10	1	10	1	0	0	11	1
IDW Samples (Solid)								
TCLP Metals	--	--	1	0	0	0	1	0

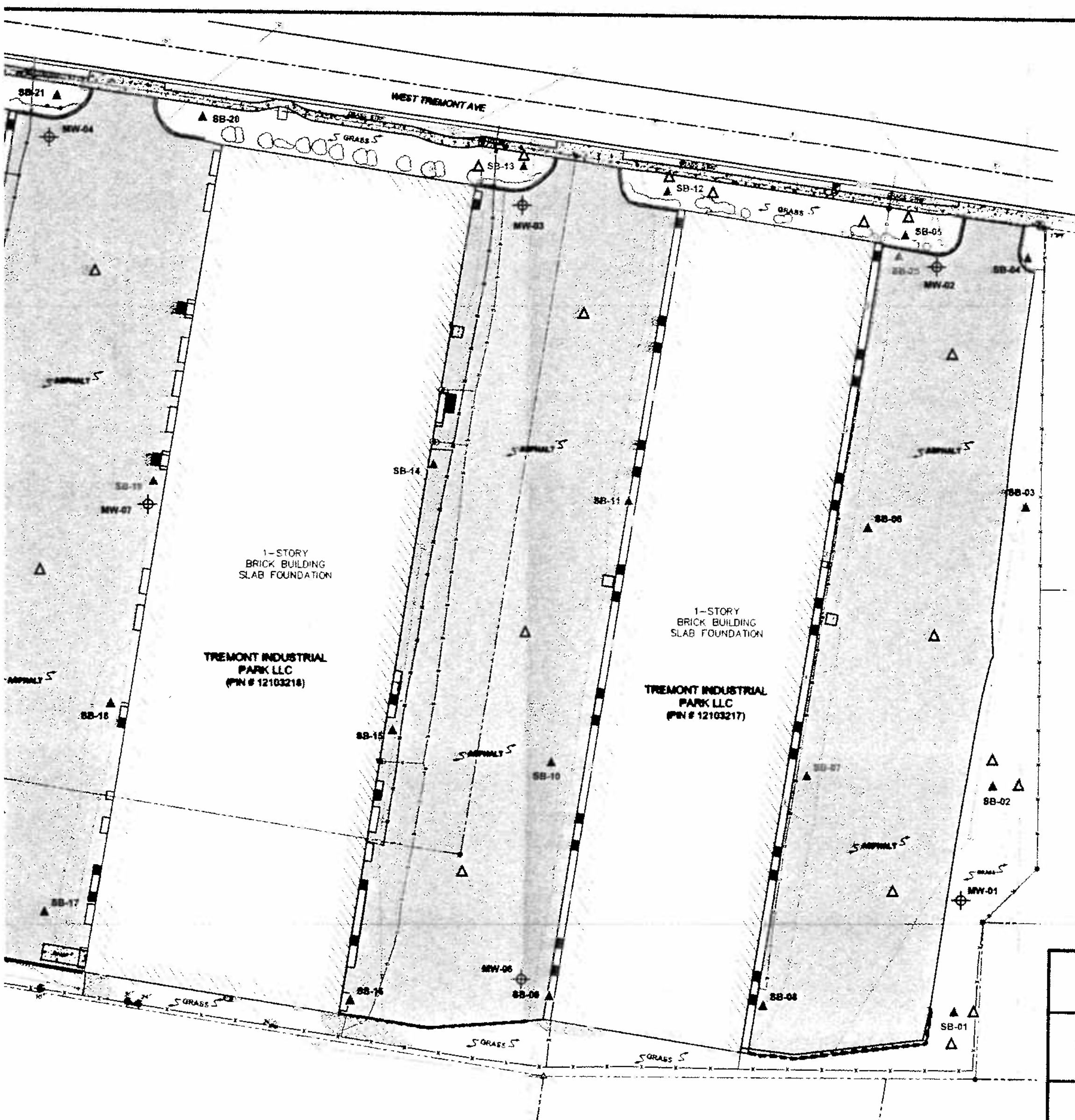
Notes:

[1] The number of samples per boring and total number of samples are approximate.

1. Field duplicate and field quality control (QC) samples will be collected at a frequency of 5% (1 for every 20 samples).
2. Equipment rinse blanks will be collected at a frequency of one per day.
3. Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected at a frequency of 5% (1 for every 20 samples).
4. Number of soil delineation borings based on 29 new locations, including 7 monitoring well borings.
5. Number of waste disposal samples are estimated. The specific samples selected for TCLP analyses will be determined following receipt of preliminary laboratory analytical data.

IDW - investigation-derived waste

TCLP - Toxicity Characteristic Leaching Procedure



LEGEND:

- PROPERTY LINES
- FENCE
- ASPHALT
- TREES
- WATER LINE
- GAS LINE
- ELECTRIC
- OVERHEAD ELECTRIC
- RIP RAP
- SOIL BORING LOCATION BELOW SCREENING LEVELS
- SOIL BORING LOCATION WITH As AND/OR Pb ABOVE USEPA AND NCDENR SCREENING LEVELS
- SOIL BORING LOCATION WITH As AND/OR Pb ABOVE NCDENR SCREENING LEVELS
- LOCATION OF PROPOSED SOIL BORING
- LOCATION OF PROPOSED GROUNDWATER MONITORING WELL

NOTES:

1. BASEMAP AND SOIL BORING LOCATIONS PROVIDED BY TAYLOR, WISEMAN & TAYLOR ON NOVEMBER 02, 2010. SOIL BORINGS 1-5, 12, 13, 20 AND 21 WERE LOCATED BY ARCADIS IN APRIL 2010 USING GPS.
2. SOIL BORINGS BEGIN WITH THE PREFIX "CH-".
3. mg/kg – MILLIGRAMS PER KILOGRAM.
4. USEPA – UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.
5. NCDENR – NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES.

0 60' 120'

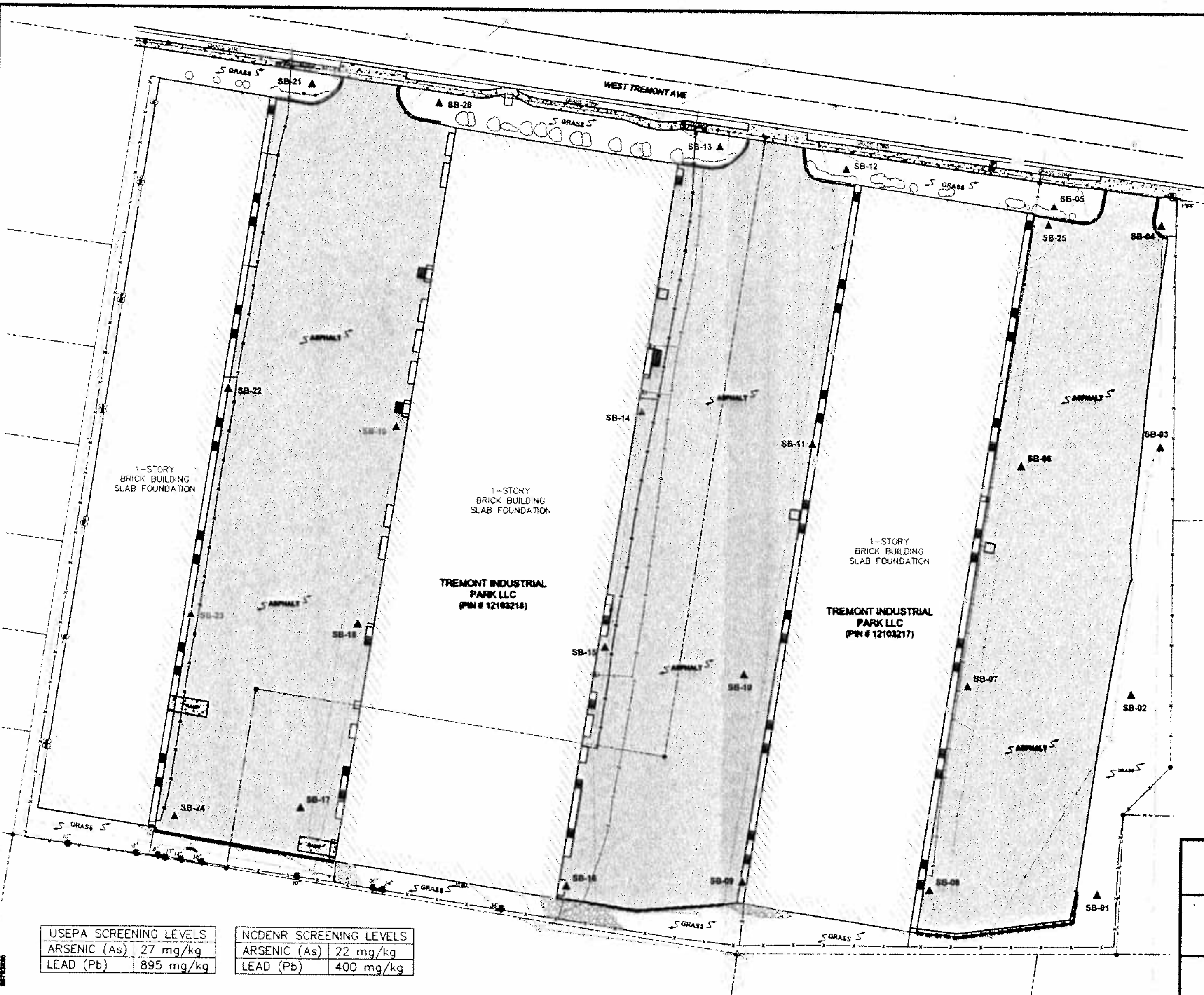
GRAPHIC SCALE

EXXONMOBIL
VCC-CHARLOTTE, NORTH CAROLINA
SITE DELINEATION WORK PLAN

PROPOSED SOIL BORING AND GROUNDWATER MONITORING WELL LOCATIONS

ARCADIS

FIGURE
3-1



USEPA SCREENING LEVELS	
ARSENIC (As)	27 mg/kg
LEAD (Pb)	895 mg/kg

NCDENR SCREENING LEVELS	
ARSENIC (As)	22 mg/kg
LEAD (Pb)	400 mg/kg

LEGEND:

- PROPERTY LINES
- FENCE
- ASPHALT
- TREES
- WATER LINE
- GAS LINE
- ELECTRIC
- OVERHEAD ELECTRIC
- RIP RAP
- SOIL BORING LOCATION BELOW SCREENING LEVELS
- SOIL BORING LOCATION WITH As AND/OR Pb ABOVE USEPA AND NCDENR SCREENING LEVELS
- SOIL BORING LOCATION WITH As AND/OR Pb ABOVE NCDENR SCREENING LEVELS

NOTES:

1. BASEMAP AND SOIL BORING LOCATIONS PROVIDED BY TAYLOR, WISEMAN & TAYLOR ON NOVEMBER 02, 2010. SOIL BORINGS 1-5, 12, 13, 20 AND 21 WERE LOCATED BY ARCADIS IN APRIL 2010 USING GPS.
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5. NCDENR – NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES.

0 60' 120'

GRAPHIC SCALE

EXXONMOBIL
VCC-CHARLOTTE, NORTH CAROLINA
SITE DELINEATION WORK PLAN

LOCATIONS OF RSE SOIL BORINGS WITH SOIL SAMPLES THAT EXCEED SCREENING LEVELS

ARCADIS

FIGURE
2-2

Table 3-1
Environmental and Quality Control Sample Analyses
Site Delineation Work Plan
VCC Charlotte, North Carolina

Environmental Sample Matrix Laboratory Parameters	Estimated Environmental Sample Quantity	Field QC Samples						Estimated Environmental and Field QC Sample Total	Laboratory QC Samples[2]				Total Estimated Environ. and QC Samples
		Trip Blank		Field Duplicate		Rinse Blank[1]			Matrix Spike		Matrix Spike Duplicate		
		Freq.	No.	Freq.	No.	Freq.	No.		Freq.	No.	Freq.	No.	
Soil													
Arsenic and Lead	145	--	--	1/20	8	1/day	4	157	1/20	8	1/20	8	173
pH	145	--	--	1/20	8	--	--	153	--	--	--	--	153
TCLP Arsenic and Lead	10	--	--	1/20	1	--	--	11	1/20	1	1/20	1	13
TCLP Metals (IDW Sample)	1	--	--	--	--	--	--	1	--	--	--	--	1
Groundwater (Permanent Monitoring Wells)													
Arsenic and Lead	7	--	--	1/20	1	1/day	2	10	1/20	1	1/20	1	12
TAL Metals (IDW Sample)	2	--	--	--	--	--	--	2	--	--	--	--	2
pH (IDW Sample)	2	--	--	--	--	--	--	2	--	--	--	--	2

Notes:

\1 One rinse blank per day per type of sample collection equipment used.

\2 The number of laboratory QC analyses is based on the frequencies given for the number of environmental samples estimated not including field QC analyses, but assumes that the samples will be processed in groups of 20 samples.

3. The number of soil samples analyzed for metals and pH is estimated.
4. TAL and metals analyses will be run using SW-846 methods.